

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

LISTING OF CLAIMS:

1. (Currently Amended): A fluorescence imaging apparatus, comprising:
 - i) excitation light irradiating means for irradiating excitation light to a measuring site, the excitation light causing the measuring site to produce fluorescence,
 - ii) imaging means for imaging the fluorescence, which has been produced from the measuring site when the excitation light is irradiated to the measuring site, and
 - iii) imaging control means for controlling operations of the imaging means, wherein the imaging means is provided with an image sensor, which comprises a plurality of pixels arrayed in two-dimensional directions and which has a fluorescence imaging region utilized for the imaging of the fluorescence and a non-imaging region other than the fluorescence imaging region, and

the imaging control means controls such that, when signal charges are to be read from the image sensor, signal charges, which have been accumulated in at least certain pixels among pixels falling within the non-imaging region, are read with a quick reading operation, in which the signal charges are read at a reading speed higher than the signal charges are read at a reading speed higher than the reading speed for the fluorescence imaging region, said non-imaging region consisting of a region where no fluorescence is received.

AMENDMENT UNDER 37 C.F.R. § 1.116
U.S. Appln. No.: 09/777,681

2. (Currently Amended): A fluorescence imaging apparatus, comprising:
 - i) excitation light irradiating means for irradiating excitation light to a measuring site, the excitation light causing the measuring site to produce fluorescence,
 - ii) imaging means for imaging the fluorescence, which has been produced from the measuring site when the excitation light is irradiated to the measuring site, and
 - iii) imaging control means for controlling operations of the imaging means, wherein the imaging means is provided with an image sensor, which comprises a plurality of pixels arrayed in two-dimensional directions and which has a fluorescence imaging region utilized for the imaging of the fluorescence and a non-imaging region other than the fluorescence imaging region, and

the imaging control means controls such that, when signal charges are to be read from the image sensor, signal charges, which have been accumulated in at least certain pixels among pixels falling within the non-imaging region, are read with a binning reading operation, in which the signal charges having been accumulated in a plurality of the pixels are added together, and a total sum signal charge having been obtained from the addition is read, said non-imaging region consisting of a region where no fluorescence is received.

3. (Currently Amended): A fluorescence imaging apparatus, comprising:
 - i) excitation light irradiating means for irradiating excitation light to a measuring site, the excitation light causing the measuring site to produce fluorescence,

AMENDMENT UNDER 37 C.F.R. § 1.116
U.S. Appln. No.: 09/777,681

ii) imaging means for imaging the fluorescence, which has been produced from the measuring site when the excitation light is irradiated to the measuring site, and

iii) imaging control means for controlling operations of the imaging means, wherein the imaging means is provided with an image sensor, which comprises a plurality of pixels arrayed in two-dimensional directions and which has a fluorescence imaging region utilized for the imaging of the fluorescence and a non-imaging region other than the fluorescence imaging region, wherein the non-imaging region comprises a region where the fluorescence is not received, and

the imaging control means controls such that, when signal charges are to be read from the image sensor, signal charges, which have been accumulated in at least certain pixels among pixels falling within the non-imaging region, are prevented from being read, said non-imaging region consisting of a region where no fluorescence is received.

4. (Currently Amended): A fluorescence imaging apparatus, comprising:

i) excitation light irradiating means for irradiating excitation light to a measuring site, the excitation light causing the measuring site to produce fluorescence,

ii) imaging means for imaging the fluorescence, which has been produced from the measuring site when the excitation light is irradiated to the measuring site, and

iii) imaging control means for controlling operations of the imaging means, wherein the imaging means is provided with a charge transfer type of image sensor, which comprises a plurality of pixels arrayed in two-dimensional directions and which has a fluorescence imaging region utilized for the imaging of the fluorescence and a non-imaging

AMENDMENT UNDER 37 C.F.R. § 1.116
U.S. Appln. No.: 09/777,681

region other than the fluorescence imaging region, wherein the non-imaging region comprises a region where the fluorescence is not received, and

the imaging control means controls such that, when signal charges are to be read from the image sensor, signal charges, which have been accumulated in pixels falling within a certain area of the non-imaging region, are read with either one of a quick reading operation, in which the signal charges are read at a reading speed higher than the reading speed for the fluorescence imaging region, and a binning reading operation, in which the signal charges having been accumulated in a plurality of the pixels are added together, and a total sum signal charge having been obtained from the addition is read, and signal charges, which have been accumulated in pixels falling within the other area of the non-imaging region, are prevented from being read,
said non-imaging region consisting of a region where no fluorescence is received.

5. (Currently Amended): An apparatus as defined in Claim 3 or 4 wherein the image sensor is provided with a clearing section for clearing signal charges, which have been accumulated in pixels, said non-imaging region consisting of a region where no fluorescence is received.

6. (Original): An apparatus as defined in Claim 3 or 4 wherein the image sensor is provided with horizontal shifting means, from which the signal charges are read in one direction, the imaging control means controls such that the signal charges having been accumulated in the pixels are transferred to the horizontal shifting means and are then read from the horizontal shifting means, and

AMENDMENT UNDER 37 C.F.R. § 1.116
U.S. Appln. No.: 09/777,681

the fluorescence imaging region is located at a position shifted from a center position on an imaging surface of the image sensor toward a side corresponding to a read-out side of the horizontal shifting means.

7. (Original): An apparatus as defined in Claim 5 wherein the image sensor is provided with horizontal shifting means, from which the signal charges are read in one direction, the imaging control means controls such that the signal charges having been accumulated in the pixels are transferred to the horizontal shifting means and are then read from the horizontal shifting means, and

the fluorescence imaging region is located at a position shifted from a center position on an imaging surface of the image sensor toward a side corresponding to a read-out side of the horizontal shifting means.

8. (Original): A fluorescence imaging apparatus, comprising:

- i) excitation light irradiating means for irradiating excitation light to a measuring site, the excitation light causing the measuring site to produce fluorescence,
- ii) imaging means for imaging the fluorescence, which has been produced from the measuring site when the excitation light is irradiated to the measuring site, and
- iii) imaging control means for controlling operations of the imaging means, wherein the imaging means is provided with a random access type of image sensor, which comprises a plurality of pixels arrayed in two-dimensional directions and which has a fluorescence imaging region utilized for the imaging of the fluorescence and a non-imaging region other than the fluorescence imaging region, and

AMENDMENT UNDER 37 C.F.R. § 1.116
U.S. Appln. No.: 09/777,681

the imaging control means controls such that, when signal charges are to be read from the image sensor, only the signal charges, which have been accumulated in pixels falling within the fluorescence imaging region, are read.

9. (Previously Presented): The imaging apparatus according to claim 3, wherein the non-imaging region is blocked by an opaque film.

10. (Previously Presented): The imaging apparatus according to claim 3, wherein the imaging control means prestores data indicating which regions of the image sensor correspond to non-image areas, and prevention of reading of signal charges is based on the prestored data.

11. (Previously Presented): The imaging apparatus according to claim 3, wherein the imaging control means stores data indicating which regions of the image sensor correspond to non-image areas on a line by line basis of the array and prevention of reading of signal charges is based on the stored data.

12. (Previously Presented): The imaging apparatus according to claim 6, wherein the non-imaging region is blocked by an opaque film

13. (Previously Presented): The imaging apparatus according to claim 6, wherein the imaging control means prestores data indicating which regions of the image sensor correspond to non-image areas, and prevention of reading of signal charges is based on the prestored data.

14. (Previously Presented): The imaging apparatus according to claim 6, wherein the imaging control means stores data indicating which regions of the image sensor correspond to

AMENDMENT UNDER 37 C.F.R. § 1.116
U.S. Appln. No.: 09/777,681

non-image areas on a line by line basis of the array and prevention of reading of signal charges is based on the stored data.

15.-19. (Cancelled).

20. (Previously Presented): The apparatus of claim 1, wherein the control means prestores data indicating which regions of the image sensor correspond to non-imaging regions and the quick reading operation is based on the prestored data.

21. (Previously Presented): The apparatus of claim 2, wherein the control means prestores data indicating which regions of the image sensor correspond to non-imaging regions and the binning operation is based on the prestored data.

22. (Previously Presented): The apparatus of claim 8, wherein the control means prestores data indicating which regions of the image sensor correspond only to areas where fluorescence is to be read, and the reading operation is based on the prestored data.